DISCUSSION OF THE AMENDMENT

The specification has been amended to clarify and distinguish between the two crosslinking agents ("first" and "second" crosslinking agents) used in the invention. These amendments are supported by the specification and claims, as originally filed.

The "first" crosslinking agent refers to the crosslinking agent used in the resin film composition, as supported by original claim 1. In particular, the resin is crosslinked when heating the resin film materials, comprising the polyolefin copolymer emulsion, tannic acid and/or ammonium vanadate and silica particles, to a predetermined temperature to dry. Support can be found in the specification at page 15, lines 11-23, and Examples 1-8, as originally filed.

The "second" crosslinking agent refers to the crosslinking agent used in the preparation of the polyolefin copolymer resin molecular-associated by ion cluster, as supported by original claim 2. In particular, the polyolefin copolymer resin is prepared by ionomerizing an olefin-ethylenically unsaturated carboxylic acid copolymer resin, and making the resulting ionomer high in molecular with the crosslinking agent. Support can be found in the specification at page 8, lines 16-23, page 15, lines 11-23, and Examples 1-8, as originally filed.

Claims 1 and 2 have been amended, in accordance with the above-mentioned amendments to the specification, to distinguish between the crosslinking agents recited in the claims. Support can be found in the specification at page 8, lines 16-23, page 15, lines 11-23, and Examples 1-8, as originally filed.

Claims 1 and 9 have been amended to recite that the resin film is formed "directly" on a surface of the hot dip galvanized steel sheet, as suggested by the Examiner. Support can be found in the specification, as originally filed, at page 6, lines 4-16 and Examples 1-8.

Claim 8 has been canceled, in view of the amendment to claim 1, without prejudice or disclaimer.

Claim 10 has been amended for minor editorial purposes.

No new matter is believed to have been added by these amendments.

INTERVIEW SUMMARY

Applicants wish to thank Examiner Kruer for the courtesies extended to Applicants' representative at the interview held on May 10, 2005. At that time, Applicants' representative discussed the structural differences between the claimed resin-coated hot dip galvanized steel sheet and the steel sheets disclosed in the prior art references cited in the Office Action. The following remarks further expand upon the discussion with the Examiner.

REQUEST FOR RECONSIDERATION

The claimed invention relates to a hot dip galvanized steel sheet having a resin film formed directly thereon.

Conventionally, in applications where steel sheets are used in a coated state, a hot dip galvanized layer is alloyed to form a Zn-Fe alloy layer between the base steel sheet and the plating layer for improving the coating adherence. However, conventional hot dip galvanizing can be insufficient for attaining a steel sheet that is satisfactory in corrosion resistance. Hot dip Zn-5% Al alloy coated steel sheets have also been developed, which can be better in corrosion resistance than conventional hot dip galvanized steel sheets. However, these steel sheets can also have unsatisfactory corrosion resistance. In addition, when they are used as coating substrates, it can be difficult to ensure a satisfactory adherence to a coating material used. As a remedial measure, the application of chromate treatment to the surface of a hot dip galvanized steel sheet has been conducted. However, when chromate treatment is performed, the adherence to the resulting coating can be unsatisfactory.

Many studies have been performed to create a surface treating method not using chromate, in which the surface of a hot dip galvanized layer is coated directly with an organic film. However, the resin-coated hot dip galvanized steel sheets thus far proposed have not had satisfactory adherence of the organic films to the hot dip galvanized layer. In particular, the organic films can peel off at the interface with the plating layer.

The present inventors have found that the claimed hot dip galvanized steel sheet, having the specifically claimed resin film formed thereon, is excellent in corrosion resistance without the need of chromate treatment. In addition, the claimed hot dip galvanized steel sheet exhibits excellent weldability and machinability. Such a resin-coated hot dip galvanized steel sheet is nowhere disclosed or suggested in the cited prior art references of record. Accordingly, reconsideration of the claimed invention is respectfully requested.

The rejections under 35 U.S.C. § 103(a) of claims 1-6, 9, and 10 over U.S. Patent No. 5,496,652 to Sasaki et al. in view of JP 50139129A ("JP '129"); claim 8 over Sasaki et al. in view of JP '129, and further in view of U.S. Patent No. 4,496,652 to Greene; and claim 7 over Sasaki et al. in view of JP '129, and further in view of U.S. Patent No. 4,496,652 to Shimizu et al., are respectfully traversed.

Sasaki et al. do not describe or suggest the claimed resin-coated hot dip galvanized steel sheet of the claimed invention.

Sasaki et al. generally disclose a zinc plated steel sheet having a resin coated film formed on the surface (column 3, lines 3-5). The zinc plated steel sheet includes a "base steel sheet plated with zinc or a zinc alloy" (column 3, line 11) and a chromate treating layer formed on the plating layer" (column 3, line 12), in which the "resin coating film [is] formed on the chromate treating layer" (column 3, line 16) (emphasis added). The resin layer includes "a resin composition" and "silica," in which the "resin composition [contains] an ethylene-based ionomer resin and a silane compound having in the molecule a single silicon atome and 2 to 4 silyl ether bonds and/or its condensate" (column 3, lines 18-23). According to the reference, there is provided "a steel sheet which exhibits high resistances to corrosion and to the blackening problem and which permits suppressing the scratch occurrence or the like by forming a chromate treating layer on the plating layer of a zinc-plated steel sheet, followed by forming a special resin layer on the chromate treating layer" (column 3, lines 44-51) (emphasis added). In addition, note that the disclosed steel sheet in the reference may be "plated with pure zinc or a zinc alloy by the electroplating or hot dipping" (column 4, lines 7-9); however, "a pure zinc-plated steel sheet plated by electroplating" is preferred (column 4, lines 9-13; and Examples 1-22).

In contrast, the claimed invention recites a hot galvanized steel sheet with a resin film formed **directly** on a surface of the steel sheet, in which there are no intervening film or

plating layers between the resin film and the surface of the hot dip galvanized steel sheet (present claim 1; specification at page 6, lines 4-16; Examples 1-8). In addition, the claimed resin film composition requires a **polyolefin copolymer resin molecular-associated by ion cluster**,10 to less than 55 mass % of **silica particles**, 1 to 8 mass % of a **first crosslinking agent**, and 1 to 8 mass % of **at least one of tannic acid** and **ammonium vanadate** (present claim 1). "[B]y adjusting [the] composition of the resin film appropriately there [can] be obtained a resin-coated hot dip galvanized steel sheet not only improved in corrosion resistance and electric conductivity but also remarkably improved in such characteristics as film adherence and machinability" (page 7, lines 14-19). As Sasaki et al. fail to describe a resin coating formed "directly" on a hot dip coated steel sheet, each of the components of the claimed resin composition, the absence of a chromate treating layer, and/or that corrosion resistance and other properties can be achieved without chromate treatment, the claimed invention is not obvious.

In addition, Applicants note that an electroplated zinc steel sheet, as used in Sasaki et al., is not used in the claimed invention. In particular, "the present inventors have confirmed that in the case of a Zn electroplated steel sheet, even if the foregoing film is formed on the steel sheet surface, desired characteristics (especially corrosion resistance) are not exhibited" (present specification at page 17, lines 12-16). The Examiner's attention is directed to Tables 7 and 8 from pages 30-31 of the present specification, portions of which are reproduced below. In each instance, the tables demonstrate that when electroplated zinc master steel sheets (**EG**) have the claimed resin film applied thereto, properties such as corrosion resistance are unsatisfactory (**x**).

Table 7

No.	Master Sheet	Skin Pass Elongation Percentage (%)	Corrosion Resistance
58	**EG**	**0**	×

Table 8

No.	Master Sheet	Surface roughness Ra (μm)	Corrosion Resistance
67	**EG**	**0.8**	×

As Applicants clearly show that electroplated zinc steel sheets are not useful for the claimed invention, there would be no reasonable expectation of success whatsoever in achieving the claimed invention based on Sasaki et al., since the reference explicitly discloses and suggests the use of electroplated zinc steel sheets.

The references to JP '129, Greene, and Shimizu et al. do not cure the deficiencies of Sasaki et al., since there is no evidence or suggestion that it would have been obvious to specifically eliminate the use of a chromate treating layer, modify the composition of the resin layer, and/or use a steel sheet that is not zinc-electroplated.

The reference to JP '129 merely discloses an anticorrosive resin powder coating on a steel sheet (see Abstract). The resin powder composition may contain, *inter alia*, an acrylic copolymer and tannic acid (see Abstract). However, there is no evidence that reference discloses or suggests that the acrylic copolymer has been formulated such that it is a polyolefin copolymer resin "molecular-associated by ion cluster," such as prepared in the claimed invention. In addition, the reference only recites that the resin is "coated on a steel and baked" (Abstract) (emphasis added). There is no evidence that the steel sheet is specifically a "hot dip galvanized" steel sheet, or that a zinc-electroplated steel sheet is used or excluded.

Greene generally discloses the improved passivation of plated metal surfaces (column 1, lines 7-8). The passivation system "is chromium free or has a low chromium content" (column 3, lines 37-38). However, Greene does not describe or suggest the hot dip galvanized steel sheet of the claimed invention. In particular, in several embodiments, zinc electroplated substrates are used (see, e.g., Examples 4, 10, and 21). In addition, the

reference does not disclose or suggest a resin film composition containing each of the components of the claimed invention.

Shimizu et al. general disclose a metal sheet which has both sides laminated with a thermoplastic resin film (column 1, lines 8-14). The resin may be "directly extruded on both sides of a steel sheet," "thermally laminated to both sides of a steel sheet," or "laminated to both sides of a steel sheet by laying an adhesive between the resin film and the steel sheet" column 7, lines 7-16). However, the steel sheet preferably has a "double layered film" containing "an upper layer of hydrated chromium oxide" and "a lower layer of metallic chromium" (column 9, lines 1-5; Examples 2-3). In addition, the thermoplastic resin only comprises a polyester resin (column 6, line 60 - column 7, line 4), which does not include each of the components of the claimed resin film.

As JP '129, Greene, and Shimizu et al. do not suggest that claimed invention, and there is no evidence that one would selectively piece together the claimed invention based on the deficient disclosure of Sasaki et al., the claimed invention is not obvious in view of the combined references.

Thus, in view of the foregoing reasons, Applicants respectfully request the withdrawal of the rejections under 35 U.S.C. § 103(a).

Applicants submit that the application is now in condition for allowance. Early notification of such allowance is earnestly solicited.

Respectfully submitted,

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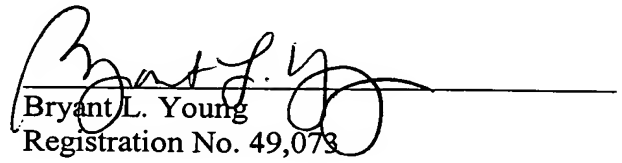
Norman F. Oblon



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